4. A single layer of cells covering the stem, known as the epidermis.

The vascular bundle consists of xylem (wood) on the inside and of phloem on the outside. The function of these tissues is the translocation of water, minerals, and foods within the plant. Between the vascular bundles and immediately to the outside of them, are thin-walled cells. These cells have not become specialized and, under certain conditions, readily become meristematic (capable of dividing to form new cells). Certain cells of the phloem are also capable of becoming meristamatic.

When the basal cut is made many of the cells are injured. Within a short time, however, the cut surface becomes covered with a layer of corky cells known as suberin, which are developed by the uninjured cells adjacent to the cut surface. Groups of cells between the vascular bundles or immediately external to it, begin to divide, forming many new cells of small size. The resulting cells continue to divide and gradually this group of newly formed cells take on the orientation and appearance of a root tip. The vascular tissue (xylem and phloem) of the new root and of the stem become connected. The first root primordia usually arise within one or two millimeters of the cut surface. Subsequently new roots arise higher on the stem.

In the young stem of woody plants, and frequently in herbaceous stems late in the growing season, a

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band of cells located between the xylem and phloem starts to divide. This band of cells is known as the cambium. The cambium bands of adjacent vascular bundles gradually extend laterally and become connected. Thus there is developed a continuous band of cambium around the entire stem. Some of the cells formed by the cambium differentiate into phloem but most of the new cells become xylem. The addition of xylem and phloem by the cambium results in the increased growth in the diameter of the plant.

A short time after the cutting is made, the cut surface becomes suberized and a short time later callus usually forms on the base of the cutting. It is formed primarily by division of the cells of the cambium and the adjacent phloem, however, cells of the adjacent parts of the stem may contribute to the formation of basal callus. Callusing usually precedes rooting. While the callus is being formed, root initials may also be developing in the stem tissue, immediately above the basal cut. In most woody plants the roots develop from the phloem tissue which in turn has developed from the cambium. The first initials usually arise within a few millimeters of the basal cut, but subsequently roots arise higher on the stem. In some instances a cambium develops within the callus tissue and root initials may develop from cells derived from this cambium. Only rarely do roots arise directly from the callus on the base of the stem cutting.

An abundant supply of carbohydrates favors rooting. The function of the leaf in the production of carbohydrates has been recognized and emphasized for many

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